

TOSHIBA Photocoupler GaAs Ired & Photo-Transistor

TLP130

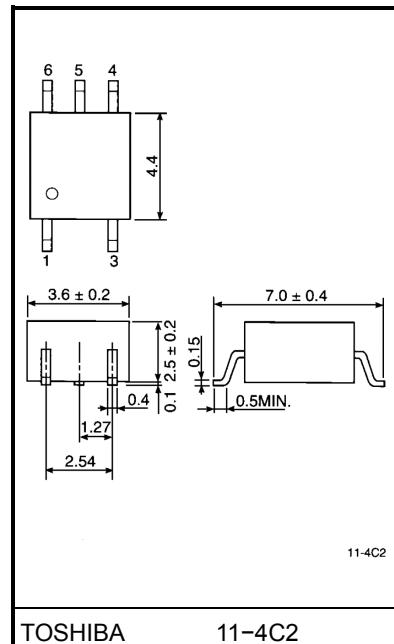
Programmable Controllers
AC / DC-Input Module
Telecommunication

The TOSHIBA mini flat coupler TLP130 is a small outline coupler, suitable for surface mount assembly.

TLP130 consists of a photo transistor, optically coupled to two gallium arsenide infrared emitting diode connected inverse parallel, and operate directly by AC input current.

- Collector-emitter voltage: 80V(min.)
- Current transfer ratio: 50%(min.)
Rank GB: 100%(min.)
- Isolation voltage: 3750VRms(min.)
- UL recognized: UL1577, file no.E67349
- Current transfer ratio

Unit in mm

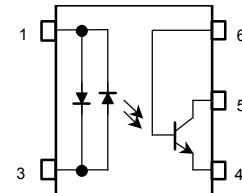


TOSHIBA 11-4C2

Weight: 0.09 g

Classi- fication	Current Transfer Ratio		Marking Of Classification	
	$I_F = 5mA, V_{CE} = 5V, Ta = 25^\circ C$			
	Min.	Max.		
Standard	50	600	Blank, Y, GR, GB	
Rank GB	100	600	GB,GR	

(Note) Application type name for certification test,
please use standard product type name, i.e.
TLP130(GB): TLP130



1 : Anode, Cathode
 3 : Cathode, Anode
 4 : Emitter
 5 : Collector
 6 : Base

Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating	Unit	
LED	Forward current	I _{F(RMS)}	50	mA	
	Forward current derating (Ta≥53°C)	ΔI _F / °C	-0.7	mA / °C	
	Peak forward current (100μs pulse,100pps)	I _{FP}	1	A	
	Junction temperature	T _j	125	°C	
Detector	Collector-emitter voltage	V _{CEO}	80	V	
	Collector-base voltage	V _{CBO}	80	V	
	Emitter-collector voltage	V _{ECO}	7	V	
	Emitter-base voltage	V _{EBO}	7	V	
	Collector current	I _C	50	mA	
	Peak collector current (10ms pulse,100pps)	I _{CP}	100	mA	
	Power dissipation	P _C	150	mW	
	Power dissipation derating (Ta≥25°C)	ΔP _C / °C	-1.5	mW / °C	
	Junction temperature	T _j	125	°C	
Storage temperature range		T _{stg}	-55~125	°C	
Operating temperature range		T _{opr}	-55~100	°C	
Lead soldering temperature (10s)		T _{sol}	260	°C	
Total package power dissipation		P _T	200	mW	
Total package power dissipation derating (Ta≥25°C)		ΔP _T / °C	-2.0	mW / °C	
Isolation voltage (AC, 1min., RH ≤ 60%)		(Note 1)	BV _S	3750	Vrms

(Note 1) Device considered a two terminal device: Pins 1 and 3 shorted together and pins 4, 5 and 6 shorted together.

Recommended Operating Conditions

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	V _{CC}	—	5	48	V
Forward current	I _{F(RMS)}	—	16	25	mA
Collector current	I _C	—	1	10	mA
Operating temperature	T _{opr}	-25	—	85	°C

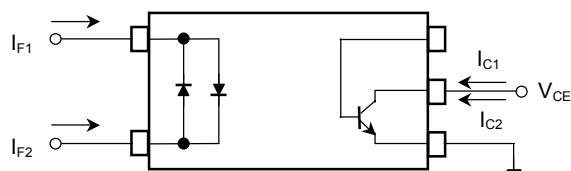
Individual Electrical Characteristics ($T_a = 25^\circ C$)

Characteristic		Symbol	Test Condition	Min.	Typ.	Max.	Unit
LED	Forward voltage	V_F	$I_F = \pm 10\text{mA}$	1.0	1.15	1.3	V
	Capacitance	C_T	$V = 0, f = 1\text{MHz}$	—	60	—	pF
Detector	Collector-emitter breakdown voltage	$V_{(\text{BR})\text{CEO}}$	$I_C = 0.5\text{mA}$	80	—	—	V
	Emitter-collector breakdown voltage	$V_{(\text{BR})\text{ECO}}$	$I_E = 0.1\text{mA}$	7	—	—	V
	Collector-base breakdown voltage	$V_{(\text{BR})\text{CBO}}$	$I_C = 0.1\text{mA}$	80	—	—	V
	Emitter-base breakdown voltage	$V_{(\text{BR})\text{EBO}}$	$I_E = 0.1\text{mA}$	7	—	—	V
	Collector dark current	I_{CEO}	$V_{CE} = 48\text{V}$	—	10	100	nA
			$V_{CE} = 48\text{V}, T_a = 85^\circ C$	—	2	50	μA
	Collector dark current	I_{CER}	$V_{CE} = 48\text{V}, T_a = 85^\circ C$ $R_{BE} = 1\Omega$	—	0.5	10	μA
	Collector dark current	I_{CBO}	$V_{CB} = 10\text{V}$	—	0.1	—	nA
	DC forward current gain	h_{FE}	$V_{CE} = 5\text{V}, I_C = 0.5\text{mA}$	—	400	—	—
Capacitance collector to emitter		C_{CE}	$V = 0, f = 1\text{MHz}$	—	10	—	pF

Coupled Electrical Characteristics ($T_a = 25^\circ C$)

Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Current transfer ratio	I_C / I_F	$I_F = \pm 5\text{mA}, V_{CE} = 5\text{V}$ Rank GB	50	—	600	%
			100	—	600	
Saturated CTR	$I_C / I_{F(\text{sat})}$	$I_F = \pm 1\text{mA}, V_{CE} = 0.4\text{V}$ Rank GB	—	60	—	%
			30	—	—	
Base photo-current	I_{PB}	$I_F = \pm 5\text{mA}, V_{CB} = 5\text{V}$	—	10	—	μA
Collector-emitter saturation voltage	$V_{CE(\text{sat})}$	$I_C = 2.4\text{mA}, I_F = \pm 8\text{mA}$	—	—	0.4	V
		$I_C = 0.2\text{mA}, I_F = \pm 1\text{mA}$	—	0.2	—	
		Rank GB	—	—	0.4	
Off-state collector current	$I_{C(\text{off})}$	$I_F = \pm 0.7\text{mA}, V_{CE} = 48\text{V}$	—	1	10	μA
CTR symmetry	$I_{C(\text{ratio})}$	$I_C(I_F = -5\text{mA}) / I_C(I_F = 5\text{mA})$ (Note 2)	0.33	—	3	—

$$(Note 2) I_{C(\text{ratio})} = \frac{I_{C2}(I_F = I_{F2}, V_{CE} = 5\text{V})}{I_{C1}(I_F = I_{F1}, V_{CE} = 5\text{V})}$$



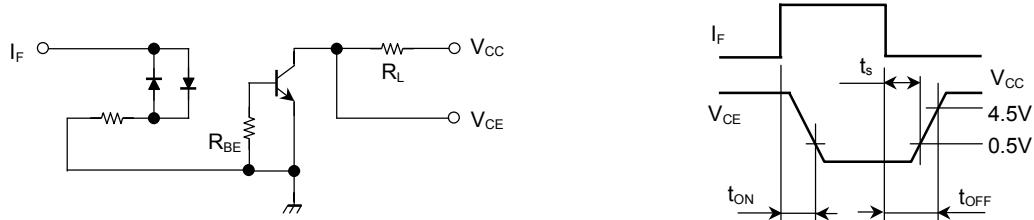
Isolation Characteristics (Ta = 25°C)

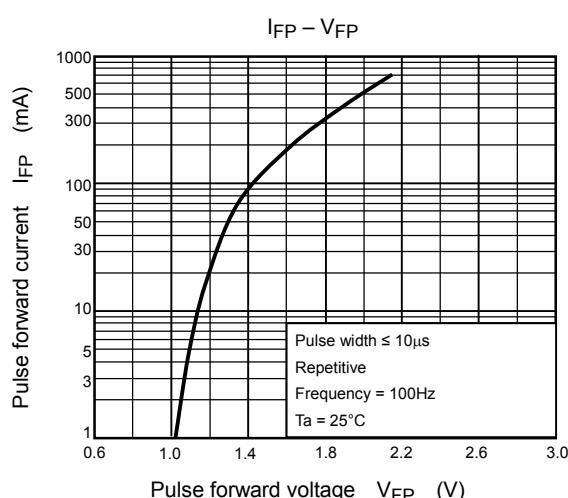
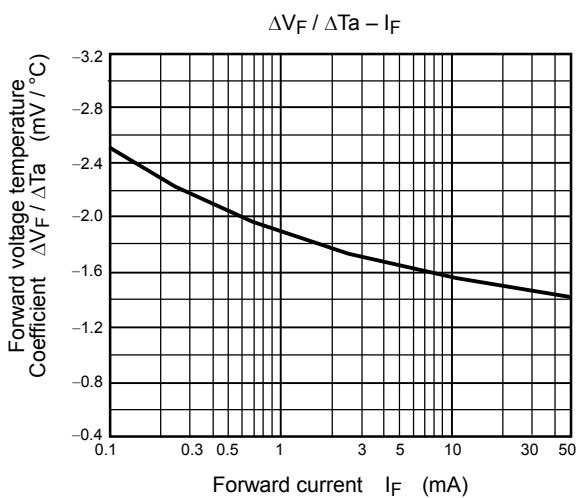
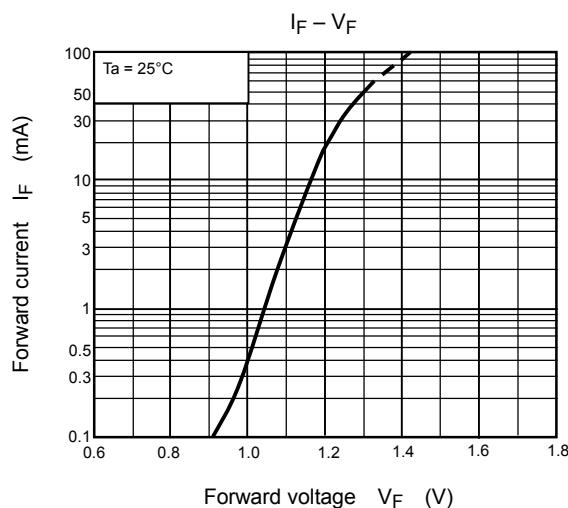
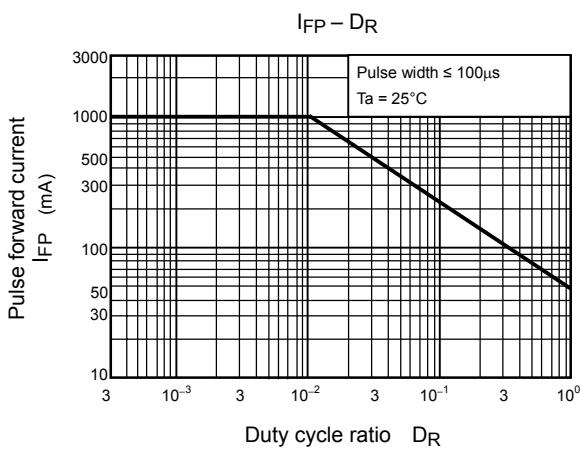
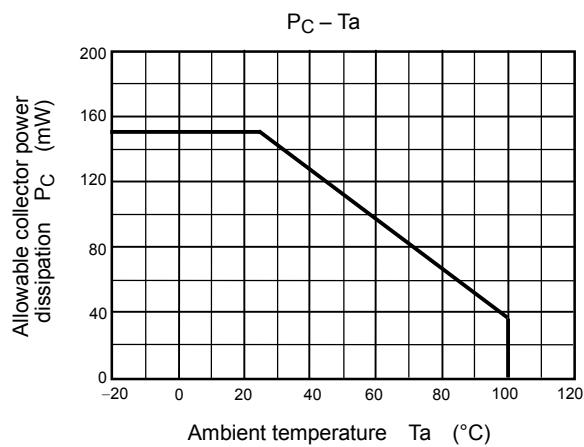
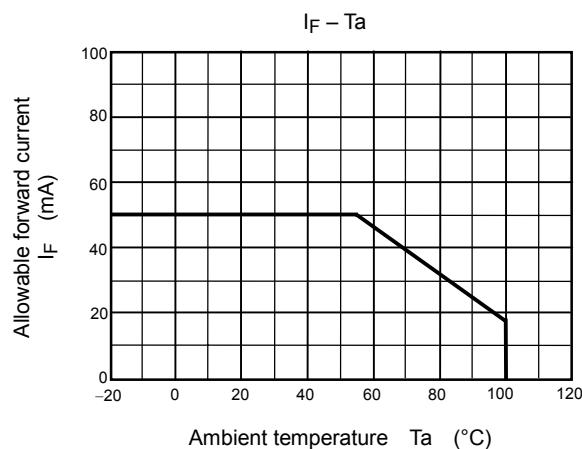
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Capacitance input to output	C_S	$V_S=0$, $f=1\text{MHz}$	—	0.8	—	pF
Isolation resistance	R_S	$V_S=500\text{V}$	5×10^{10}	10^{14}	—	Ω
Isolation voltage	BV_S	AC, 1 minute	3750	—	—	VRms
		AC, 1 second, in oil	—	10000	—	
		DC, 1 minute, in oil	—	10000	—	Vdc

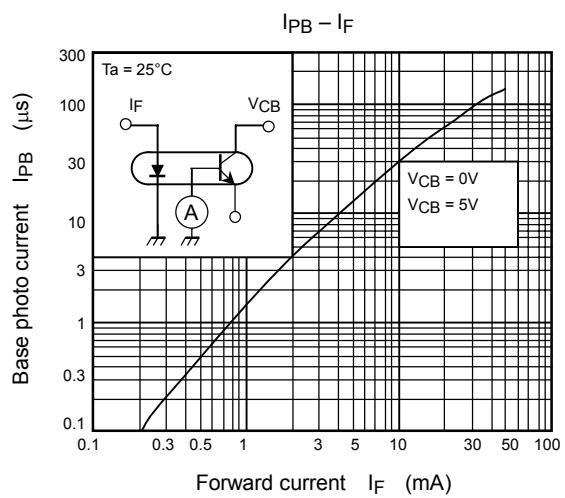
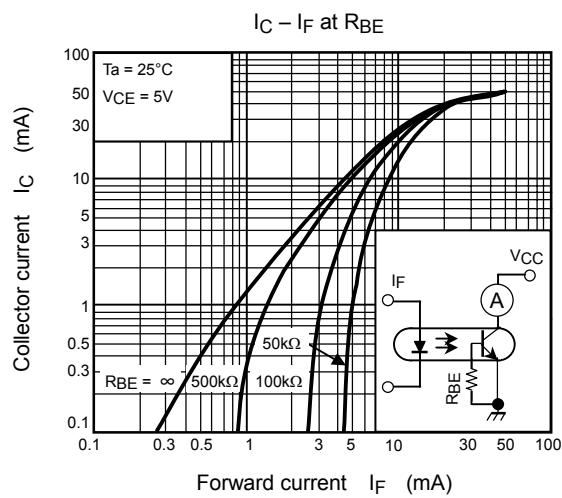
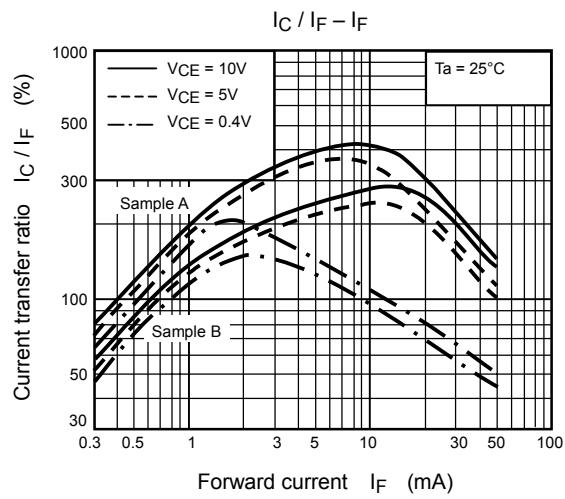
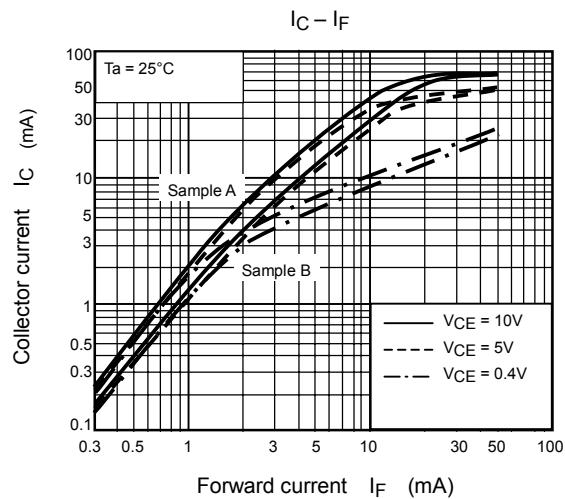
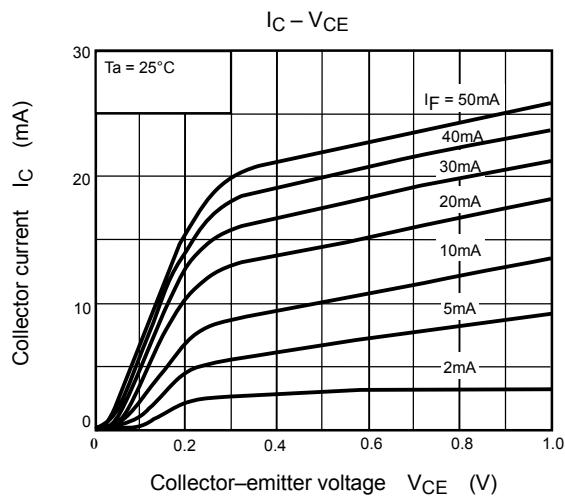
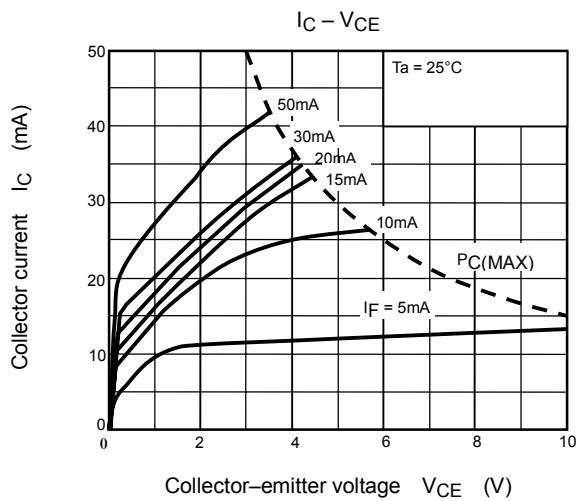
Switching Characteristics (Ta = 25°C)

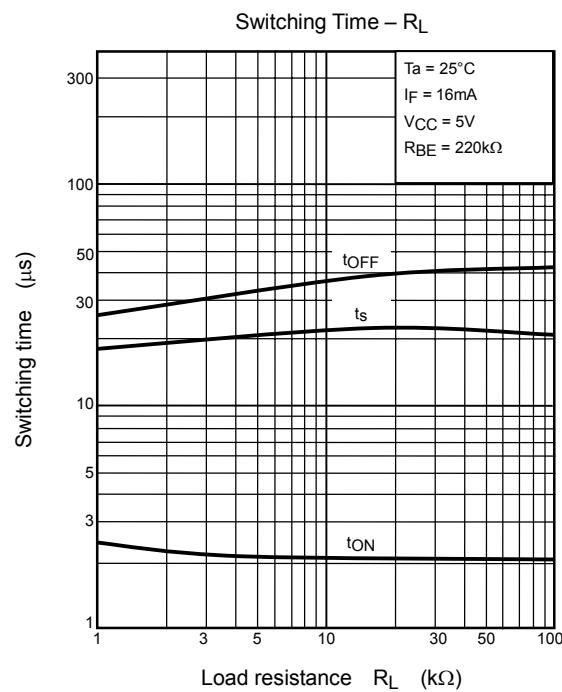
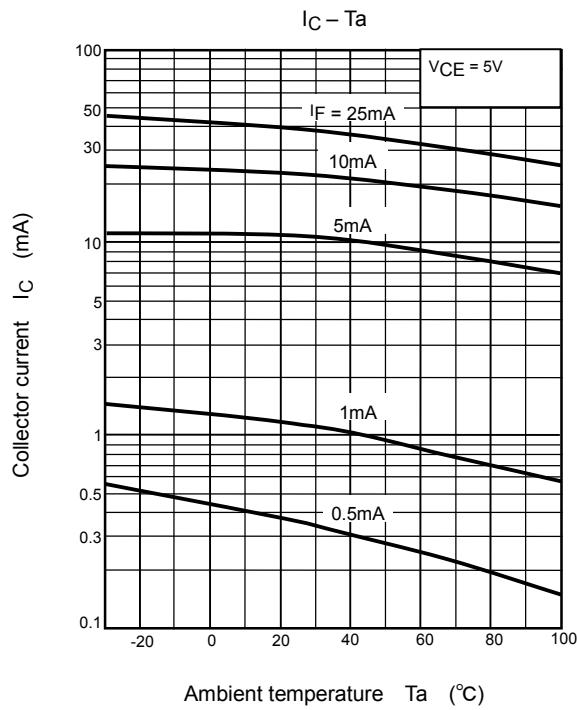
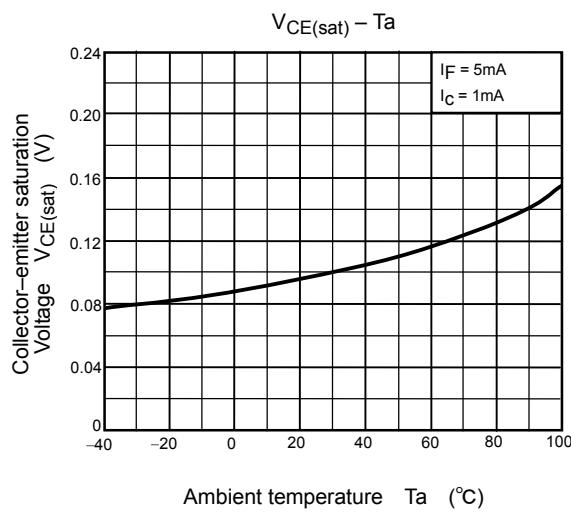
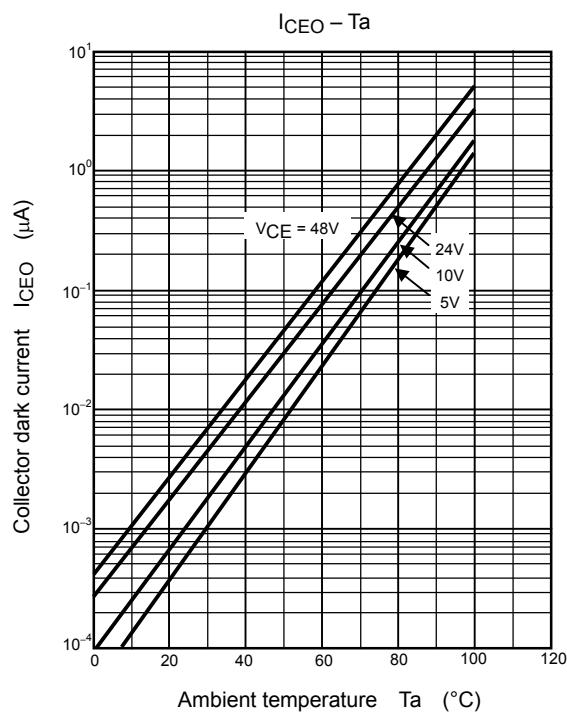
Characteristic	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Rise time	t_r	$V_{CC} = 10\text{V}$, $I_C = 2\text{mA}$ $R_L = 100\Omega$	—	2	—	μs
Fall time	t_f		—	3	—	
Turn-on time	t_{ON}		—	3	—	
Turn-off time	t_{OFF}		—	3	—	
Turn-on time	t_{ON}	$R_L = 1.9\text{k}\Omega$ $R_{BE} = \text{OPEN}$ $V_{CC} = 5\text{V}$, $I_F = \pm 16\text{mA}$	—	2	—	μs
Storage time	t_s		—	25	—	
Turn-off time	t_{OFF}		—	40	—	
Turn-on time	t_{ON}	$R_L = 1.9\text{k}\Omega$ $R_{BE} = 220\text{k}\Omega$ $V_{CC} = 5\text{V}$, $I_F = \pm 16\text{mA}$	—	2	—	μs
Storage time	t_s		—	20	—	
Turn-off time	t_{OFF}		—	30	—	

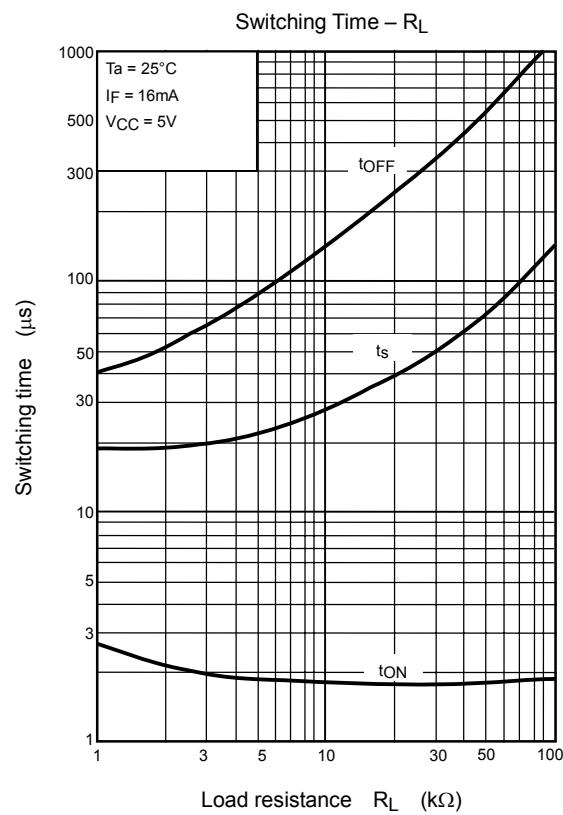
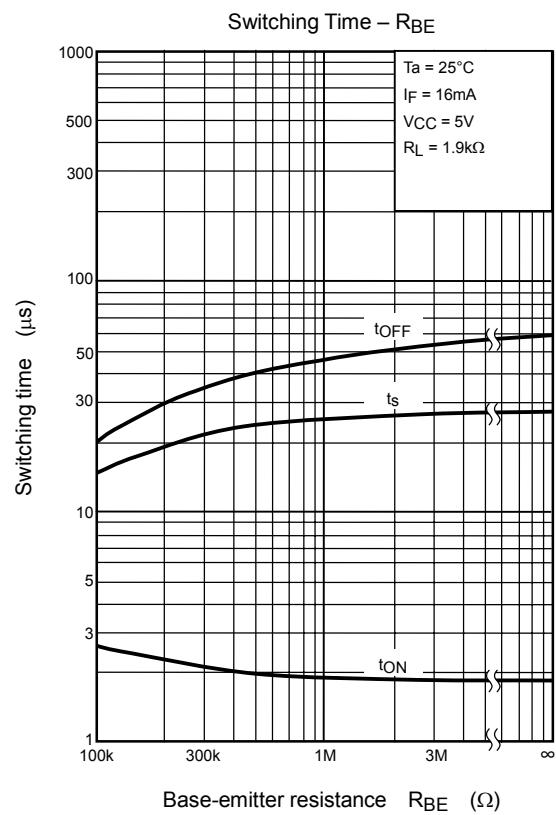
Fig. 1 Switching time test circuit











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